

## **REMARKS**

By the present amendment, claims 26 to 33, 35, 37, 38 and 41 to 43 are pending in the application. Claims 26, 27, 37 and 38 are independent claims.

### **Support For Claims**

#### **Claim 26 and 27**

Independent claims 26 and 27 have been amended to clarify the meaning of the alkali/(zinc + lead) ratio.

Claims 26 and 27 were amended with respect to the alkali/(zinc + lead) ratio in response to a rejection under 35 U.S.C. §112, second paragraph.

In claims 26 and 27, the rotary hearth type reduction furnace being “provided with an exhaust gas treatment facility ...” is based upon prior dependent claim 34.

#### **Claims 37 and 38**

Independent claims 37 and 38 have been amended by inserting the limitations of dependent claims 39 and 40.

#### **Claim 43**

New dependent claim 43 is based upon canceled dependent claim 36 rewritten to provide antecedents.

Dependent claim 36 was canceled and replaced with new claim 43 in response to a rejection under 35 U.S.C. §112, second paragraph.

#### **§112, ¶2**

Claims 26 to 36 were rejected under 35 U.S.C. §112, second paragraph, as being indefinite.

In response to this rejection, claims 26 and 27 have been amended to clarify the meaning of the alkali (zinc + lead) ratio.

In response to this rejection, dependent claim 36 has been canceled and replaced with new dependent claim 43 to provide proper antecedents.

In view of the present amendment, it is respectfully requested that the rejections under 35 U.S.C. §112, second paragraph, be withdrawn.

### **§103**

(A). Claims 26 to 33 and 35 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,942,198 to Myerson et al. in view of U.S. Patent No. 5,851,490 to Myerson et al. and U.S. Patent No. 6,755,888 to Ibaraki et al.

(B). Claim 34 was rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,942,198 to Myerson et al. in view of U.S. Patent No. 6,755,888 to Ibaraki et al. and further in view of U.S. Patent No. 6,648,942 to Hoffman et al.

(C). Claim 36 was rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 5,942,198 to Myerson et al. in view of U.S. Patent No. 5,851,490 to Myerson et al. and U.S. Patent No. 6,775,888 to Ibaraki et al. and further in view of U.S. Patent No. 6,368,379 to Tateishi et al.

(D). Claims 37, 38 and 42 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,775,888 to Ibaraki et al. in view of U.S. Patent No. 6,368,379 to Tateishi et al.

(E). Claims 39 to 41 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 6,775,888 to Ibaraki et al. in view of U.S. Patent No. 6,368,379 to Tateishi et al. and further in view of U.S. Patent No. 5,942,198 to Myerson et al.

These rejections, as applied to the amended claims, are respectfully traversed.

## **Patentability**

### **Difference between claims 26-27 & 28-29 and USP 5,851,490 (“ ‘490 patent”)**

The present invention provides a method of reduction treatment of metal oxides characterized by using as a feed material a mixed powder of a powder containing both iron oxide and zinc oxide and/or lead oxide and a powder containing carbon (claim 26) or without containing carbon (claim 27) and containing alkali metals and halogen elements wherein the alkali/(zinc + lead) ratio is at least 0.1, where alkali is total of moles of alkali salts and (zinc + lead) is total moles of zinc + lead, mixing the feed material with water to produce a slurry having a pH of 7 to 11.5, then dehydrating this, mixing (claim 27) or without mixing (claim 26) the dehydrated material with another feed material, and charging the dehydrated material into a rotary hearth type reduction furnace for reduction.

The Office Action asserted that Table 1 of the ‘490 patent shows a ratio of  $(\text{NaO} + \text{NaCl}) + (\text{KaO} + \text{KCl}_2) / (\text{ZnO} + \text{PbO})$  is within the scope of the present invention, and therefore, the invention claimed by the present application is unpatentable over the ‘490 patent.

However, it is submitted that the Office Action is a misunderstanding because the numerator in the above formula contains NaO and KaO which are compounds other than alkali salts. The present invention does not use these oxides. Further the ‘490 patent does not disclose or suggest the basic present inventive idea which prevents dust sticking to the exhaust gas treatment apparatus by means of controlling the mole ratio of alkali salts and (zinc + lead).

Therefore, the invention claimed in claims 26 and 27 is patentable.

Regarding claims 28 and 29, they are patentable because the subject matter of claims 26 and 27 are patentable.

Further, regarding claim 29, the Office Action asserted that USP 5,942,198 ('198 patent) describes the conditions before dehydrating treatment and USP 6,755,888 ('888 patent) describes the conditions after dehydrating treatment, and therefore, one can easily combine these conditions.

However, the present invention requires both conditions simultaneously present because condition changes before and after the compressive formation is very important. Both of the '198 patent and the '888 patent do not disclose or suggest that condition changes before and after the compressive formation are very important and both of the condition must be carried out simultaneously.

**Difference between claim 30 and USP 5,942,198 ('198 patent)**

Claim 30 defines that the slurry is heated at 80°C or less and agitated. The Office Action asserted that the '198 patent describes the feed materials containing zinc or zinc oxide is added to the ammonium chloride solution at a temperature of about 90 or above. However, according to the present invention, the maximum slurry temperature must be kept at 80°C or less. On pages 21-22, line 29 to line 4, of the specification, it is clearly mentioned that "Further, under conditions of a water temperature of 80°C, the speed of dissolution of the alkali salts becomes about 5 times faster and the effect is further increased, but with a water temperature of more than 80°C, there is almost no further effect of increase of the speed of dissolution of the alkali salts, the amount of energy consumed in raising the water temperature increases, and there is the detrimental effect of the generation of vapor at the slurry agitation

tank. Therefore, the upper limit of the slurry heating temperature for promoting dissolution of the alkali salts is 80°C, preferably 40°C to 80°C.

Therefore, there is a large technical difference between 90°C or above defined in the '198 patent and 80°C or less defined in the present invention of claim 30.

**Difference between claim 31 and USP 6,755,888 ('888 patent)**

The Office Action asserted that the '888 patent discloses that the cylindrical or granular shaped articles are fed into a rotary hearth reducing furnace for calcination without drying treatment.

However, the '888 patent does not disclose or suggest the feature of the present invention of claim 31 which shapes the dehydrated material into moist shaped articles having a porosity of at least 35%.

**Difference between claim 32 and USP 6,755,888 ('888 patent)**

The Office Action asserted that the '888 patent describes the cylindrical or granular shaped articles have a thickness or diameter of 30 mm or less.

However, the '888 patent does not define an average volume of the articles.

Further, the '888 patent does not disclose or suggest the feature of the present invention of claim 32 which makes a mass ratio of powder and water in the dehydrated material 1:0.2 to 1:0.4 and shaping the dehydrated material into moist shaped articles having an average volume of not more than 10000 mm<sup>3</sup>.

**Difference between claim 33 and USP 6,755,888 ('888 patent)**

The Office Action asserted that the '888 patent discloses that in the reaction among the reaction to produce carbon monoxide and the reaction to produce carbon dioxide, 10-70% of the carbon atoms reactive with iron oxide are reacted to produce carbon dioxide through it changes for different conditions.

However, this value is different from that of the present invention. Further, the '888 patent does not disclose or suggest the feature of the present invention which makes molar ratio of oxygen and carbon contained in the shaped articles 1:0.6 to 1:1.5.

**Difference between dependent claim 36 (now new dependent claim 43) and the '198 patent, the '490 patent and the '888 patent**

The Office Action asserted that the subject matter of claim 36 (now claim 43) is unpatentable by the combination the '198 patent, the '490 patent with the '888 patent without disclosing the feature that the exhaust gas contains zinc or lead. However, USP 6,368,379 ('379 patent), column 6, lines 22-26 discloses that "As shown in Fig. 3, zinc, which is a typical volatile component contained in the agglomerate 1, starts to be steeply volatilized when surface temperature of the agglomerate 1 exceeds 1250°C. When the gas containing this volatile component is discharged from the exhaust site of the regenerative burner 2, the volatile component is accumulated in the regenerator", and therefore zinc contained in the exhaust gas is easily removed.

However, there is no basis to assume that the same reaction has occurred in the present invention based on the above description because temperature and gas flow rate conditions are different in the regenerative burner and the usual exhaust gas treatment

equipment. Further, the present invention can treat both alkali and zinc, not only zinc itself as disclosed in the '379 patent.

**Difference between amended claims 37 and 38 and claim 41 and the '198 patent**

The features claimed in claims 37, 38 and 41 are 1) pH adjuster is a substance containing OH-groups, 2) pH adjuster is fly ash discharged from a refuse melting furnace or incinerator, 3) pH of the slurry adjusted in pH by the pH adjuster is at least 8. The Office Action asserted that the '198 patent describes that dust contains fly ash (column 8, line 26), and pH is adjusted more than 10 (column 16, lines 12-17), and the intermediate contains sodium hydroxide (column 7, lines 35-38). However, the purpose of these features is that "As the zinc, lead and cadmium contained in the feed materials are amphoteric species, by using ammonium chloride solution these species will go into solution, while any iron oxide present in the feed material will not go into solution" (column 16, lines 12-16).

On the other hand, the present invention is quite the opposite from the purpose of the '198 patent because of the pH condition in which zinc or lead do not dissolve.

**Summary**


It is therefore submitted that amended independent claims 26, 27, 37 and 38, and all claims dependent thereon, are patentable.

**CONCLUSION**

It is submitted that in view of the present amendment and the foregoing remarks, the application is now in condition for allowance. It is therefore respectfully requested that the application, as amended, be allowed and passed for issue.

Respectfully submitted,

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Dated: November 4, 2008

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